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ABSTRACT

An annotated bibliography of 33 studies on recognition of and intervention into test anxiety (TA) for elementary school students (grades 1 through 8) is provided, and the research results are analyzed. Focus is on increasing the ability of educators to recognize students experiencing TA and to examine methods of reducing its effects. A basic premise is that students experiencing TA do not perform to their potential, resulting in an underestimation of their abilities by educators. The bibliography covers visible and invisible indicators of TA and methods of intervening to reduce or eliminate TA. The intervention methods include adaptations of the testing situation, learning strategies, test-wiseness instruction, and coping skills instruction. The annotated titles are listed alphabetically by author within each indicator and method section. The bibliography does not cover cultural variables, differences related to age and gender, or physiological effects. A glossary of terms is included. (TJH)

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Recognition and Intervention
of Interfering Test Anxiety:
An Annotated Bibliography

by

Jeanne Mitchell DuBois

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INTRODUCTION

Tests are commonplace events in the classroom situation. They are used by educators throughout the school years to determine remedial needs, instructional groupings, grades, promotion and graduation. That they are accurate is therefore important. Occasionally a teacher will find a student whose test results do not reflect the performance seen in the classroom. Anxiety may be interfering but unless this anxiety is recognized the educator may underestimate the student's abilities and poor educational decisions may result. Through various forms of intervention the student may be enabled to perform to his ability.

It is important to note that the incidence of interfering test anxiety in classrooms may be increasing due to current trends (Hill and Wigfield, 1977, Wilson and Rotter, 1983). Wilson and Rotter identified the "back to basics" movement caused by the 1983 report from the National Commission on Excellence in Education (1983). They continued, as "more pressure is applied on the nation's school system to document success, it seems reasonable to assume that more pressure will be felt by its students" (1983). Hill and Wigfield specifically pointed out the increased pressure caused for students by minimal competency testing, as now required in most states (1977).

STATEMENT OF THE PROBLEM

Students experiencing interfering test anxiety do not perform to their potential, resulting in an under-estimation of their abilities by educators.

PURPOSE OF THE STUDY

The purpose of this study was to increase the ability of educators to recognize students experiencing test anxiety and to examine methods of reducing its effects.

ORGANIZATION OF THE STUDY

The first section of this study deals with the recognition of students experiencing interfering test anxiety and is divided into two parts: (1) visible indicators, and (2) non-visible indicators. The second section examines methods of intervention and is divided into four parts: (1) adaptations of the testing situation, (2) learning strategies, (3) test-wiseness instruction, and (4) coping skills instruction. The annotations are listed alphabetically by author in each part.

LIMITATIONS OF THE STUDY

This study was limited to examining test anxiety and intervention in first through eighth grades. Cultural variables, differences as to age and gender and physiological effects were not included.

Anxiety - "Apprehension, tension, or uneasiness characterized by fear, dread, or uncertainty, the source of which is largely unknown or unrecognized by the individual; may consist in persistent apprehension of future events as well as in generalized emotional reactions to any choice point or decision" (Good: 34).

Anxiety Management Training - "Relaxation training, construction of a scene that arouses high and low anxiety, imagery to arouse anxiety, attention to the physiological cues of anxiety arousal, training in switching from arousal to relaxation imagery, and experience in anxiety arousal followed by self-induction of anxiety control" (Wilson and Rotter: 22).

Attentional Training - "Direct...attention away from irrelevant cognitions and towards the task at hand" (Little and Jackson: 175).

Clustering Learning Strategy - "Remembering...by grouping into... component categories" (Walters and Tobias: 1).

Coding - "The act or process of using a code to substitute systematically one set of symbols for another" (Good: 110).

Concentration - "Difficulty in maintaining attention on task" (Schmitt and Crocker: 1982, 273).

Concept Formation - "The development, through abstraction, of a mental process which refers to more than one object or experience or to one object in relation to others (Good: 125).

Control, Experimental - "The attempt to equalize, by direct methods, the effects of one or more extraneous factors on the criterion measures in an experiment" (Good: 136).

Coping Skills Training - "Active instruction of clients in the identification of indexes of anxiety and the execution of behavior that will reduce or eliminate tension... aimed at instructing the individual in generalizable methods for reducing anxiety" (Barrios and Shigetomi: 491, 492).

Desensitization - "(1) Therapeutic process by which traumatic experiences are reduced in intensity by repeated exposures of the individual to them either in reality or in fantasy" (Good: 174).

Dynamic Assessment - "Permits analysis of how individual differences in test performance are affected through modifications in testing conditions...approach which incorporates human factors..." (Bethge, Carlson and Wiedl: 89).

Emotionality - "Physiological and affective reactions to the stress of the testing situation" (Schmitt and Crocker: 1982, 273).

Galvanic Skin Response - "See psychogalvanic skin response."

Group Control - "(1) The one of two or more groups that is not subjected to the experimental factor or condition introduced into the treatment of the control group, (2) the group with which the experimental group or groups are compared" (Good: 267).

Imagery Training - "Creating a mental picture of the words to be learned so that during later testing the mental picture serves as a memory cue..." (Cubberly, Weinstein and Cubberly: 164).

Intervention - "Any action on the part of an organism that serves to change the relative position of the objects or forces of the environment and of the organism itself thus bringing new stimuli to bear upon the organism" (Good: 314).

Learning, Latent - "Learning without apparent motivation or reinforcement, where a relatively long period of time elapses between the stimuli and the response or before the awareness of learning as evidenced by performance" (Good: 333).

Learning, Paired Associate - "Learning in which elements (words, designs, things etc.) when learned in pairs become associated so that when one is presented as a stimulus, the other is recalled" (Good: 333).

Learning Strategies - "Rules, principles, and procedures acquired in learning, often discovered by the learner himself and applicable in other learnings" (Good: 334).

Memory Support - "Aid of a record of prior trials, thereby reducing the need to recall details of prior trials" (Sieber, Kameya and Paulsen: 160).

Mnemonic Device - "Any artificial device, such as a familiar or striking formation or words, an acronym, a jingle etc., to aid the learner in retaining memorized information" (Good: 370).

Person Fit Indices - "Indices measuring the degree of unusual response patterns" (Schmitt and Crocker 1984, 4).

Psychogalvanic Skin Response (P.S.G.R.) - "(1) Decreased electrical resistance of the skin, due to physiological activities under the control of the autonomic nervous system, following sensory or ideational excitation; (2) increase in the electromotive force of the skin under conditions similar to (1)" (Good:456).

Quieting Reflex - Teaches the individual how to short circuit the body's usual physiological reaction to disturbing thoughts and events and reverse this process so that, within a few seconds, calmness results rather than tension" (Danielson: 153).

Response Patterns - "(1) (Scoring) a set of specified responses to a group of items which has significance over and above that provided by a weighted sum of scores for the group of items" (Good: 498).

Sentence Elaboration - "...Creating sentences that combine together the words to be learned" (Cubberly, Weinstein and Cubberly: 164).

Skills, Study - "Any special ability used in study, such as reading, outlining, summarizing or locating material" (Good: 537).

Success Imagery - Visualize an upcoming event, "to feel comfortable and confident about it, and to anticipate doing as well as possible" (Danielson: 154).

Test Anxiety - "Fear of taking examinations; unpleasant emotional reactions elicited by anticipation of a testing situation; may have an effect on the test performance of the subject" (Good: 595).

Test-Wiseness - "A subject's capacity to utilize the characteristics and formats of the test and/or the test-taking situation to receive a high score; logically independent of the examiners knowledge of the subject matter which the items are supposedly measuring; includes knowledge of strategies in using time, avoiding error, guessing, reasoning deductively, and using cues and specific determiners" (Good: 604).

Worry - "Cognitive concern about the consequences of failing, the ability of others relative to one's own" (Hagtvet: 979).

RECOGNITION

VISIBLE INDICATORS

Barnard, James W., Philip G. Zimbardo and Seymour B. Sarason.
"Anxiety and Verbal Behavior in Children." Child Development 32 (1961): 379-392.

This study was designed to investigate the responses of 48 third grade students in two interview conditions. Prior to the interview situation students were assigned to a condition dependent upon their scores on an intelligence test, the Test Anxiety Scale for Children and sex. At the interview students were told either that the interview was just an interview, or, to increase anxiety, that it would be followed by a test. It was found in the examination of the students responses that the high anxiety group was significantly more negative than the low anxiety group in the test condition. The opposite relationship was found in the no-test condition. It was also found that the high anxiety students responses were significantly more unintelligible than the other anxiety groups and even slightly more so in the test condition. In addition high anxiety students were found to give answers that were concrete in content more often than low anxiety students. Barnard, Zimbardo and Sarason attributed this increased level of concrete responses to be a result of high test anxious students general cautious behavior (391).

Harnisch, Delwyn L. and Robert L. Linn. Analysis of Item Response Patterns: Questionable Test Data and Dissimilar Curriculum Practices. Paper presented at the annual meeting of the American Educational Research Association, April 1980. (ERIC Document Reproduction Service No. E_D 193 265).

Harnisch and Delwyn examined the test response patterns from a study of the effects of time pressure and anxiety on mathematics performance. One hundred seventy-three third and fourth grade students participated in the original study on which this one is based. In their examination of the response patterns matrixes from the test situations involved, they found a significant positive relationship "at both times of testing indicating a somewhat greater likelihood of aberrant response patterns for high anxious children than low anxious children" (11).

Hermans, Hubert J., Jan J. E. ter Laak and Piet C. J. M. Maes. "Achievement Motivation and Fear of Failure in Family and School." Developmental Psychology 6.3 (1972): 520-528.

Hermans, ter Laak and Maes examined student anxiety and motivation in both the home and school environment. Forty nine and ten-year-old students participated in the study. An intelligence test and the Achievement Motivation Test for Children, of which one part measures anxiety were administered. Each student was rated by their present teacher and the teacher from the year before. These teachers had no knowledge of the results from the other tests. The correlation of all the information showed high anxious students were more dependent on outside assistance than low anxious students. This dependency on others was even stronger when the student was low in intelligence.

Hill, Kennedy T. and Seymour B. Sarason. The Relation of Test Anxiety and Defensiveness to Test and School Performance Over the Elementary School Years: A Further Longitudinal Study Monographs of the Society for Research in Child Development 104: Chicago: University of Chicago Press, 1966.

Hill and Sarason examined the effects of test anxiety on performance in elementary school students over five years. At the outset of the study there were 1,104 students in grades one and two. At its conclusion there were 670 students for whom all scores were available. This report examined the students in two groups, first to fifth grade and fourth to sixth grade. Tests administered were the Test Anxiety Scale for Children, Lorge-Thorndike and Otis Intelligence Tests, The Iowa Test of Basic Skills and the Metropolitan Achievement Tests. It was found in this study that when students were matched on intelligence scores low anxiety upper grade students and lower grade girls performed better than those with high anxiety on the achievement measure.

McCandless, Boyd R. and Alfred Castaneda. "Anxiety in Children, School Achievement, and Intelligence." Child Development 27.3 (1956): 379-382.

McCandless and Castaneda examined the results of an administration of the Iowa Every Pupil Test and the Otis Quick Scoring Mental Ability Test, Form B as they correlated to anxiety scores on the Children's Form of the Manifest Anxiety Scale. The student population consisted of fourth to sixth grade public school students. There were no significant findings on the intelligence measure. However, McCandless and Castaneda found on the achievement test "a tendency for the more complicated skills (reading, arithmetic and composite performance) to suffer more interference from anxiety than simpler, mnemonic skills such as spelling" (379).

McCoy, Norma. "Effects of Test Anxiety on Children's Performance as a Function of Instructions and Type of Task." Journal of Personality and Social Psychology 2.5 (1965): 634-641.

This investigation was designed by McCoy to examine the effects of instructions and failure on test anxious students. Following administration of the Test Anxiety Scale for Children, 28 high test anxious and 28 low test anxious fourth grade boys were selected to participate. It was found that the high anxious boys performed equally well in both gamelike and testlike drawing situations. When presented with a failure drawing situation (of a nonexistent object) the high anxiety students verbalized significantly less and drew smaller pictures than the low anxiety students (634).

Nottleman, Editha D. and Kennedy T. Hill. "Test Anxiety and Off-Task Behavior in Evaluative Situations." Child Development 48 (1977): 225-231.

Glancing away from an anagram task was the method used to study 48 fourth and fifth grade students off-task behavior. It was found that high anxious students (as previously determined by their score on the Test Anxiety Scale for Children) had the lowest performance level and glanced away from the task more often than the other two groups (229). It was also found that they glanced at the experimenter (who was working a different anagram) more than the other groups. Verbalization during the task showed that highly anxious students asked significantly fewer questions of the experimenter in comparison with the other groups.

Ruebush, Britton K. "Interfering and Facilitating Effects of Test Anxiety." Journal of Abnormal and Social Psychology 60 (1960): 205-212.

Ruebush selected 48 sixth grade boys on the basis of their scores on the Yale Test Anxiety Scale, Yale General Anxiety Scale, and the Beta Test Form Em of the Otis Mental Ability Test to participate in this study examining the relationship between caution and test anxiety. The performance task used was the Witkin Embedded Figures Test. Students were scored by the amount of time it took for them to solve each task, the number of tasks solved and cautiousness. (The cautiousness score was based on the number of times the student asked to see the simple form again and the number of guesses he made before giving the correct solution.) The results showed that high cautious students performed better than low cautious students and that high anxious students cautiousness scores were higher than those of low anxious students (209). The performance of the low and medium ability high anxious students was better than that of the low anxious (209). From this last finding Ruebush concluded that "anxiety is not always disorganizing but that under certain conditions it may be facilitating" (209-210).

Schmitt, Alicia P. and Linda Crocker. The Relationship Between Test Anxiety and Person Fit Measures. Paper presented at the annual meeting of the American Research Association, April 1984 (ERIC Document Reproduction Service No ED 250 370).

The Test Anxiety Scale for Adolescents and reading, mathematics and science subtests of the Metropolitan Achievement Test were administered to 413 seventh and eighth grade students in this investigation of the relationship between test anxiety, ability and person fit. Response patterns on the achievement test were examined statistically using person fit indices. This examination showed that high ability students increased in misfit on the indices as test anxiety increased. According to Schmitt and Crocker this finding supports earlier findings "...that test anxiety can contribute to erratic performance thereby affecting their performance and response patterns" (15).

Stevenson, Harold W. and Richard Odom. "The Relation of Anxiety to Children's Performance on Learning and Problem-Solving Tasks." Child Development 36 (1956): 1003-1012.

Stevenson and Odom used a variety of tasks; paired associates, concrete discrimination, abstract discrimination, concept formation and anagrams to examine the varying effects of anxiety as measured by the Test Anxiety Scale for Children. Three hundred eighteen fourth and sixth grade students participated. It was found that high anxiety had the most negative effect on performance in the paired associates and anagram tasks. As part of the same investigation they examined the performance of these same students on the California Test of Mental Maturity and the Iowa Test of Basic Skills as they related to the students anxiety level. While Stevenson and Odom found that the low anxiety students out performed the high anxiety students on the achievement test, they found no differences in performance on the different subject areas. However, on the intelligence test they found that all students experienced more anxiety on the language section. Stevenson and Odom concluded that anxiety had the most negative effect on performance when "verbal processes" were involved (1003).

Waite, Richard R., Seymour B. Sarason, Frederick F. Lighthall and Kenneth S. Davidson. "A Study of Anxiety and Learning in Children." Journal of Abnormal and Social Psychology 57 (1958): 267-270.

The Otis Alpha Intelligence Scale was administered to the 48 second through fifth grade students participating in this study. Anxiety levels had been previously determined. Students were evenly assigned to an instruction condition (success, failure, neutral) on the basis of their anxiety level, grade, ability and sex. The performance task consisted of remembering the numbers on a series of twelve cards. The experimenter responded to the students performance on each of six trials dependent on the condition he was in. The results showed that the performance of the low anxiety students was "decidedly superior" to that of the high anxiety students (268). Instructions were not found to have an effect on performance.

Wine, Jeri Dawn. "Test Anxiety and Evaluation Threat: Children's Behavior in the Classroom." Journal of Abnormal Child Psychology 7.1 (1979): 45-59.

The results of this study are based on classroom observations of 66 fourth grade students. Within each classroom group the students were subgrouped on the basis of their scores on the Otis-Lennon Mental Ability Test, the Test Anxiety Scale for Children and by socioeconomic levels. The classes were then placed in a test expected or no-test condition. The observations took place during art classes because of the relaxed environment. It was concluded from these observations that high test anxious students listened to the teacher less and spent less time working on their assigned task in the test expected class than they did in the no-test class. They looked at other children's work less but looked for help from the teacher and other students more than the lower anxiety groups. It was also found that anxious students were both less active and verbal than their middle and low test anxious peers.

NON-VISIBLE INDICATORS

Hagtvet, Knut A. "Components of Test Anxiety Measures In and Out of Explicitly Defined Situational Contexts." Psychological Reports 43 (1978): 979-984.

This study was designed by Hagtvet to further investigate the "Worry" component of test anxiety. Hagtvet identified two components of "Worry;" "Context-free...related to 'test' per se" and "context-related...related to an interpersonal context" (979). In order to identify the importance of these components the Test Anxiety Scale for Children was altered to contain fifteen items - five each of the "Worry" components and five of "Emotionality." This altered anxiety scale and a test of vocabulary and reasoning skills were administered to 229 sixth grade students. It was determined from the results of this administration that of the two "Worry" components "context-related" had a higher significant negative effect on performance (981).

Lekarczyk, Dorothy Thorne and Kennedy T. Hill. "Self-Esteem, Test Anxiety, Stress and Verbal Learning." Developmental Psychology 1.2 (1969): 147-154.

A paired associates learning task was used to study the effects of instruction (game-test), anxiety levels and self-esteem of 114 fifth and sixth grade students. The students in the study were assigned to an instruction condition on the basis of their sex, scores on the Test Anxiety Scale for Children and on Coopersmiths Self-Esteem Inventory. Lekarczyk and Thorne found that high test anxious students made more mistakes than low test anxious students under test conditions. It was also found that high test anxious students experienced low self-esteem. While this relationship was found for both sexes it was significant for only the boys.

Schmitt, Alicia P. and Linda Crocker. "Test Anxiety and its Components for Middle School Students." Journal of Early Adolescence 2.3 (1982): 267-275.

Schmitt and Crocker examined the usefulness of the Mandler-Sarason Test Anxiety Scale for sixth to eighth grade students. The test was adapted to the age level and administered to 794 students two weeks before students were to take a standardized achievement test. Upon examination of the test results Schmitt and Crocker confirmed the importance of "Worry" and "Emotionality" as components of test anxiety for middle school students. They explained the roles of these elements stating; "Brooding thoughts about the consequences of failure and physical symptoms shift attention from the task to the self" (273). "Concentration", a third component was identified and determined to be closely related to the other two factors. It was defined as "difficulty in maintaining attention on task" (273).

Shoemaker, Allen L. "Construct Validity of Area Specific Self-Esteem: The Hare Self-Esteem Scale." Educational and Psychological Measurement 40.2 (1980): 495-501.

The main emphasis of this research was to study the validity of the Hare Self-Esteem Scale. One construct of the scale was school self-esteem which, it was hypothesized, "would be negatively correlated with a measure of test anxiety" (497). To test this component both the Hare Self-Esteem Scale and Test Anxiety Scale for Children were administered to a group of 647 fifth grade students. The hypothesis was supported - a significant negative correlation was found between school self-esteem and test anxiety.

Zatz, Sheri and Laurie Chassin. "Cognitions of Test Anxious Children." Journal of Consulting and Clinical Psychology 51.4 (1983): 526-534.

The relationships between anxiety, cognitions and performance of 398 fifth and sixth grade students were examined in this study. Anxiety levels were measured, using the Test Anxiety Scale for Children prior to the testing situation. The tests consisted of the Coding-B subtest of the Wechsler Intelligence Scale for Children-Revised and an anagram task. Students were timed on each component. Following completion of these tests students responded to the Children's Cognitive Assessment Questionnaire. It was found by Zatz and Chassin that the performance of the low anxiety group was superior to the other groups on the anagram task but there were no significant differences in the coding task. The findings also showed that the high test anxious students experienced significantly more negative self-evaluations and off-task thoughts than either the middle or low anxious students and fewer positive self-evaluations than the low anxious (526). The high test anxious students were also found to experience a significant amount of on-task thoughts, however they were not found to improve performance. A relationship was found between off-task thoughts and poor performance for boys (533).

Zatz, Sheri and Laurie Chassin. "Cognitions of Test Anxious Children Under Naturalistic Test-Taking Conditions." Journal of Consulting and Clinical Psychology 53.3 (1985): 393-401.

Zatz and Chassin investigated the relationship between test anxiety, thoughts and test performance in a mathematics test situation. Three hundred sixty-six sixth grade students participated in the study. Measurement instruments used included the Test Anxiety Scale for Children, and The Children's Cognitive Assessment Questionnaire. Heath mathematics series tests were used to evaluate math performance. The findings showed that high test anxious students experienced more off-task thoughts and they made more negative self evaluations (including ability comparisons), but this group also reported more on-task thoughts than either of the other groups. These on-task thoughts were not found to improve students performance, however, negative off-task thoughts were found to lower performance.

INTERVENTION

ADAPTATIONS OF THE TESTING SITUATION

Bethge, Hans-Jörg, Jerry S. Carlson and Karl Heinz Wiedl.
 "The Effects of Dynamic Assessment Procedures on
 Raven Matrices Performance, Visual Search Behavior,
 Test Anxiety and Test Orientation." Intelligence 6.1
 (1982): 89-97.

Seventy-two third grade students of approximately equal intelligence as determined by the Cattell Culture-Fair Intelligence Test were assigned to one of three conditions in this study designed to investigate the effects of varied testing procedures. These conditions were designated "elaborated feedback" in which upon answering the student received an immediate evaluation and explanation, "problem verbalization" in which the student described the problem before giving an answer, and "standard instruction" which served as the control. The Raven Coloured Progressive Matrices Test was administered to all the students in a manner consistent with their condition. This was followed by two anxiety questionnaires developed for this study. (These questionnaires had already been proven reliable.) It was found that performance levels increased and anxiety levels significantly decreased for both treatment conditions.

Gaudry, Eric and George D. Bradshaw. "The Differential Effect of Anxiety on Performance in Progressive and Terminal School Examinations." Australian Journal of Psychology 22.1 (1970): 1-4.

This study was conducted by Gaudry and Bradshaw to determine the effect of increased stress on students. Fourteen seventh and eighth grade classes with at least 24 students participated in the study. These students were grouped on the basis of scores from an intelligence test and a modified Test Anxiety Scale for Children. Both a "progressive" (determined by averaging three grades) and a "terminal" mathematics grade were obtained for each student from school records. The analysis of this material showed that high ability students outperformed low ability, and low anxiety students outperformed high anxiety in both testing situations (2). However, the difference between the anxiety groups performance was less in the "progressive" situation (3).

Hill, Kennedy T. and Warren O. Eaton. "The Interaction of Test Anxiety and Success-Failure Experiences in Determining Children's Arithmetic Performance." Developmental Psychology 13.3 (1977): 205-211.

The purpose of this study was to compare the performance of highly anxious students in a success-only condition to their performance in a mixed success and failure condition with time pressure. Following a screening to determine anxiety levels, sixty fifth and sixth grade children were chosen to participate. As expected, the performance of the low anxiety student was better than that of the high anxiety student in the mixed condition. It was also noted that the high anxiety student was two to three times slower and inaccurate. The same statistics were found with cheating. However, under the success condition these differences were minimized-the high anxiety student was almost as quick and accurate and cheated only a little more than the low anxiety student (209).

LEARNING STRATEGIES

Cubberly, Walter E., Claire E. Weinstein and Rebecca D. Cubberly. "The Interactive Effects of Cognitive Learning Strategy Training on Paired Associate Learning." Journal of Educational Research 79.3 (1986): 163-168.

A paired associate learning pretest and self-report test anxiety measure were administered to the ninety fourth-grade students participating in this study. The students were then assigned to one of three conditions; (1) imagery training, (2) sentence elaboration training or (3) control. Those in the treatment conditions received instructions and practiced their particular strategy. This was followed by retesting using a paired associate posttest and the anxiety measure. The reported anxiety levels of the students in the control condition were approximately the same at posttest while those of the students in the treatment conditions were much lower. The performance of the students in both treatment conditions was significantly higher than those in the control. It was also found in the imagery treatment condition the performance of high anxious students was significantly better than that of the low anxious. The reverse was found for the other conditions. The authors speculated from this finding that sentence elaboration strategies conflict with the negative self-talk experienced by high anxious students, causing it to be less effective than imagery which is visually oriented (167-168).

Sieber, Joan E., Lawrence I. Kameya and F. Leon Paulsen.
 "Effect of Memory Support on the Problem-Solving
 Ability of Test-Anxious Children." Journal of
 Educational Psychology 61.2 (1969): 159-168.

This study consisted of two experiments to determine the effects of memory support on the performance of high test anxious students. Students were chosen to participate and assigned to either a memory support or no support condition on the basis of their scores on the Test Anxiety Scale for Children. Forty fifth and sixth grade students participated in the first experiment in which their performance on a marble puzzle was studied. The second experiment, in which ninety-six students participated, consisted of a concept formation task. The results of both experiments showed that the high anxiety students in both memory support conditions performed at approximately the same level as the low anxiety students. The investigators concluded that this finding indicates that high test anxious students "may benefit from...external aids...mnemonic (internal) memory aids or information-coding strategies"(166).

Walters, Janice and Sigmund Tobias. The Effect of Anxiety and Strategy Training on Learning. Paper presented at the annual meeting of the American Educational Research Association, March 1985. (ERIC Document Reproduction Service No. ED259 016).

This study was designed by Walters and Tobias to examine the effects of training in the use of a clustering learning strategy on the performance of high anxious students. Forty-seven seventh grade students participated. The Test Anxiety Scale for Children and Worry-Emotionality Scale were administered to all the students after which they were assigned to a treatment or control condition. Training was concluded when the students in both conditions had remembered all the words in one trial correctly. This was followed by the administration of a brief unrelated test to induce stress. At the conclusion of this test students were asked to remember the words taught previously. Results showed that the performance of the high test anxious students in the treatment condition was significantly higher than that of the high test anxious students in the control.

TEST-WISENESS INSTRUCTION

Costar, Edward. "Scoring High in Reading: The Effectiveness of Teaching Achievement Test-Taking Behaviors." Elementary School Guidance and Counseling 15.2 (1980): 157-159.

Two-hundred ninety students in 14 fourth grades were divided into two groups, control and treatment. Both groups were tested with the Metropolitan Achievement Test to determine reading skill levels. Following this the treatment group began participating in the Scoring High in Reading program. This program teaches test-taking skills such as reasoning and following directions and reading curriculum skills needed to perform well on achievement tests. At the conclusion of this program both groups were retested. None of the findings reached a level of significance, however the treatment group did show improvement.

Dillard, John M., Jacqueline Warrior Benjamin and David W. Perrin. "Efficacy of Test-Wisness on Test Anxiety and Reading Achievement Among Black Youth." Psychological Reports 41 (1977): 1135-1140.

This study examined the effects of test-wisness instruction on academic performance. Sixty, sixth-grade, test anxious, low socioeconomic status, black students participated. They were assigned to one of three treatment conditions: (1) "applied test-taking self-concept," (2) test-wisness or (3) control. The students were then tested on the Test Anxiety Scale for Children and the Piers-Harris Children's Self-Concept Scale. Reading achievement was measured using the Metropolitan Achievement Test. When retested at the conclusion of the program it was found that the treatment groups showed significant improvement in both reading scores and anxiety levels when compared to the control group. There was not a significant change for either group on the self-concept measure.

Hill, Kennedy T. and Allen Wigfield. "Test Anxiety: A Major Educational Problem and What Can Be Done About It" The Elementary School Journal 85.1 (1984): 105-126.

Following an extensive review of the research on test anxiety, Hill and Wigfield presented the results on the effectiveness of a program designed to teach students test-taking skills. Sixty-five second grade students participated in the study. Thirty-one students were in the control group and 34 were in the treatment condition. Prior to beginning the program students were pretested to determine achievement levels. The treatment group attended eight instructional sessions over four weeks. These sessions included discussions as to the purposes and types of testing and definite strategies by curricular area. One week after the conclusion of this program both groups were administered the school district's achievement test. The total scores of the group which participated in the instructional program was found to be significantly higher than the scores of the control group. The program has been expanded, and according to Hill and Wigfield will continue to be documented for effectiveness.

Petty, Nancy E. and Ernest Harrell. "Effect of Programmed Instruction Related to Motivation, Anxiety and Test-Wiseness on Group IQ Test Performance." Journal of Educational Psychology 69 (1977): 630-635.

The 118 sixth-grade students participating in this study were tested using the Otis-Lennon Mental Ability Test Elementary II Level, Form J. Following this the students were divided into five groups; (1) control, (2) motivation program-designed to teach the role of testing, (3) anxiety program-designed to reduce feelings of failure, (4) test-wisness training and (5) combination of all treatments. Programmed texts were used in all treatments. At the conclusion of the program students were retested on the Otis-Lennon. An increase of scores was found in all the treatment conditions, however, the only increase that reached a level of significance was found in the comparison of gains between the control and the combination group.

CCPING SKILLS INSTRUCTION

Barbasz, Arreed F. "Group Desensitization of Test Anxiety in Elementary School." The Journal of Psychology 83 (1973): 295-301.

The results of galvanic skin responses and performance on the Lorge-Thorndike Intelligence Test were used to assign the 87 fifth and sixth grade students participating in this study to an experimental group. These groups were: (1) high test anxious students, (2) low test anxious students, and (3) control. The students in both treatment groups participated in a five-day desensitization program. At the conclusion of this program students were retested using form two of the Lorge-Thorndike Intelligence Test and galvanic skin responses were rechecked. It was found that the performance of the high anxiety students had significantly improved and their anxiety had significantly decreased. Both the low anxious students and control showed no significant changes.

Danielson, Harry A. "The Quieting Reflex and Success Imagery." Elementary School Guidance and Counseling 19.2 (1984): 152-155.

This study was designed by Danielson to examine the effects of using the quieting reflex and success imagery on test scores. Five hundred ninety-three fifth grade students participated in the program, while students from seven other schools with similar populations and achievement test scores served as the control. Students in the treatment condition were taught the quieting reflex early in the program. Training in success imagery was incorporated later in preparation for testing on the Science Research Associates Achievement Test. At the conclusion of the treatment the achievement test was administered to both groups. Significant increases in performance were found for the treatment group. The following year Danielson conducted a replication of this study with 475 fifth grade students in the treatment condition. The results again showed an increase of performance though not quite as large.

Little, Sandra and Barry Jackson. "The Treatment of Test Anxiety Through Attentional and Relaxation Training." Psychotherapy: Theory, Research and Practice 11.2 (1974): 175-178.

Thirty-seven seventh and eighth grade students found to be highly test anxious by their scores on the Test Anxiety Scale for Children, participated in this study designed to examine the effects of relaxation and attentional training. Following testing on a variety of achievement and ability tests each student was assigned to one of five conditions: (1) attentional condition, (2) relaxation condition, (3) attentional/relaxation condition which employed treatments one and two, (4) placebo expectancy condition in which the students employed the exercises of conditions one and two but were not told to focus on the task, and (5) control condition. At the conclusion of the training programs students were retested. The results of this retesting indicated a significant increase in academic performance for all the treatment conditions. However, test anxiety was significantly lower only for those students in the attentional/relaxation condition.

Mann, Jay. "Vicarious Desensitization of Test Anxiety Through Observation of Videotaped Treatment." Journal of Counseling Psychology 19.1 (1972): 1-7.

Mann designed this study to examine the effects of various desensitization procedures on test anxiety. Seventh and eighth grade students were assessed on selected subtests of the Gates-McGinnitie Reading Test and the Test Anxiety Scale for Children. Eighty were selected and assigned to one of four treatment conditions: (1) "imitation of modeled response," (2) "observation without imitation," (3) "observation of the model during visualization of the hierarchy but not during the relaxation," and (4) control (2). Presentation of the various treatments was done through the use of videotapes. The program consisted of six treatments over three weeks. Students were then retested and a follow-up test was administered four weeks later. All treatments were found to reduce anxiety significantly and this effect was maintained. There was no significant change in the control groups anxiety level. The performance of all the groups declined on the first reading reassessment, however, the control groups decline was found to be significant. Mann inferred from this that this form of the Gates-McGinnitie was harder than the one used initially (3,4). Both treatment groups did show significant performance improvement at the four-week follow-up. Mann stated in conclusion, that he believes videotaped treatment is ideal for use in schools because it is economical and can be administered by virtually anyone (6).

Wilson, Nancy H. and Joseph C. Rotter. "Anxiety Management Training and Study Skills Counseling for Students on Self-Esteem and Test Anxiety and Performance." The School Counselor 34.1 (1986): 18-31.

The Comprehensive Test of Basic Skills, the Test Anxiety Scale for Children, the Coopersmith Self-Esteem Inventory and an adapted form of the Wechsler Intelligence Scale for Children-Revised were administered to the sixth and seventh grade students eligible to participate in this study. Sixty students were selected based on their scores. These students were placed in one of five treatments: (1) anxiety management training, (2) study skills counseling, (3) modified anxiety management training-consisting of the procedures in treatments one and two, (4) attention-placebo control-self concept activities and (5) no contact control. The program lasted three weeks after which the students were retested. Two months later the students were again tested to see if learning had been maintained over time and to check for any latent learning. As a result of these two testing situations it was found that modified anxiety management training reduced test anxiety, significantly increased both self-esteem and performance levels and that these effects were maintained. The anxiety management training showed maintenance of the significant reduction of test anxiety and increased self-esteem and latent learning in performance. The study skills at follow-up showed maintenance of significantly reduced anxiety and latent learning in regard to self-esteem. Latent learning was found on self-esteem for the attention placebo control. The no contact control showed no significant changes throughout the testing.

SUMMARY

According to the research of Waite et al., and Hill and Sarason high levels of anxiety interfered with student performance. It was found in both studies that the performance of low anxious students was superior to that of high anxious students of the same ability. This interference of student performance may be indicated both in visible ways and in ways not as visible.

Performance itself was found to visibly indicate anxiety. McCandless and Castaneda in their examination of student achievement test results found performance in "complicated skills (reading, arithmetic and composite performance) to suffer more interference from anxiety than simpler mnemonic skills such as spelling" (379). The research provided by Stevenson and Odom showed that anxiety negatively affected the performance of all students on the language subtest of an intelligence test and they also found that students with high anxiety levels were negatively affected on a paired associate and anagram task. They concluded from these findings that anxiety had the most negative effect when "verbal processes" were involved (Stevenson and Odom 1003).

Test response patterns were also found to indicate interfering anxiety. Harnisch and Linn, and Schmitt and Crocker (1984) both found that highly anxious able students tended to miss easy test items yet proceeded to answer more difficult ones.

Dependency was one area of observable differences between high and low test anxious students. Wine's research found that highly test anxious students looked for help from both the teacher and other students more often. Hermans, ter Laak and Maes likewise found those experiencing high levels of anxiety to be more dependent on external support.

Research indicated that high and low anxious students differ in verbalization when under pressure. McCoy and Wine both found high anxious students to verbalize less than their peers and Nottleman and Hill reported that they asked significantly fewer questions. The interview study conducted by Barnard, Zimbardo and Sarason indicated that, under evaluative pressure, the responses of high anxiety students were more unintelligible, negative and concrete in content than those of their less anxious peers.

These concrete responses of high test anxious students were attributed by Barnard, Zimbardo and Sarason to their "proponent tendencies to respond cautiously" (391). This indication of cautious behavior was supported by Ruebush's study of student performance on an embedded figure task. He stated that while at times this cautious behavior may be helpful it "is a 'fortuitous' result of defensive reactions to his [the students'] anxiety over which he has little conscious control" (391).

Non-visible components of test anxiety, "Worry" and "Emotionality," were studied by Schmitt and Crocker (1982).

In explaining the roles of these elements they stated: "Brooding thoughts about the consequences of failure and physical symptoms shift attention from the task to the self" (273). As a result of their study they identified a third component of test anxiety which they labeled "Concentration" and defined as "difficulty in maintaining attention on task" (273). Hagtvet further studied the "Worry" component and found that students test worries were more of interpersonal comparisons than about the test itself.

The cognitive concerns of students under evaluative pressure was also the topic of Zatz and Chassin's (1983, 1985) research. They found that highly test anxious students experienced significantly more negative self evaluations (including interpersonal comparisons) and off-task thoughts than low or middle anxious students.

These negative self evaluations of high test anxious students were also reflected in the studies of self-esteem. The research of Shoemaker and Lekarczyk and Hill both found test anxiety to be negatively related to self-esteem.

Once interfering anxiety has been identified the educator may choose to intervene by adjusting the evaluative situation. Hill and Eaton found that by removing the potential for failure the performance of high test anxious students improved to approximately the same level as that of the low anxious. Likewise, Gaudry and Bradshaw found that "progressive" testing as compared to "terminal" testing reduced the performance

deficit. Bethge, Carlson and Wiedl found that by altering the assessment procedures to immediate and extensive feedback, or student description of the problem prior to answering, both improved student performance and significantly decreased anxiety.

Memory support was reported by Seiber, Kameya and Paulsen to minimize the performance deficit between high and low test anxious students. They concluded from this that high test anxious students "may benefit from...external aids...mnemonic (internal) memory aids or information - coding strategies" (166). The research of Walters and Tobias, and Cubberly, Weinstein and Cubberly addressed this conclusion. Walters and Tobias investigated the use of "clustering" strategies while Cubberly, Weinstein and Cubberly studied and compared "imagery training" and "sentence elaboration". Both studies found the use of such strategies to increase the performance of test anxious students.

According to the research of Hill and Wigfield, Dillard, Benjamin and Perrin, and Costar the teaching of test-wisness skill resulted in higher performance. Dillard, Benjamin and Perrin also found in their study that it significantly reduced anxiety levels.

Coping skills taught through anxiety management training (Wilson and Rotter), attentional training (Little and Jackson), success imagery (Danielson) and desensitization (Mann, and Barbasz) all were reported to increase the performance of test

anxious students. Of these techniques anxiety levels were reported to have decreased through anxiety management training, attentional relaxation training and desensitization.

CONCLUSION

It can be concluded from the research of Waite et al., and Hill and Sarason that high levels of anxiety decrease student performance. Stevenson and Odom determined that this anxiety was more likely to interfere in skills where "verbal processes" were involved (1003). McCandless and Castaneda found it likely to occur in "complicated skills" (379). Atypical test response patterns may be clues to this interference (Harnisch and Linn; Schmitt and Crocker, 1984).

High levels of anxiety have been found to influence student characteristics. Highly anxious students tend to be more dependent (Herman, ter Laak and Maes; Wine) and less verbal under evaluative pressure (McCoy; Wine; Nottelman and Hill) than their peers. The Lekarczyk and Hill, and Shoemaker studies both found highly test anxious students to have low levels of self-esteem. Zatz and Chassin (1983,1985) and Schmitt and Crocker determined that students experiencing interfering anxiety have "difficulty maintaining attention on task" (Schmitt and Crocker 1982; 271).

Intervention of test anxiety through changed evaluative procedures have been shown to successfully decrease the performance deficit between high and low anxious students (Hill and Eaton; Gaudry and Bradshaw; Bethge, Carlson and Wiedl) as has instruction in learning strategies (Walters and Tobias; Cubberly, Weinstein and Cubberly). Test-wiseness instruction (Hill and Wigfield; Dillard, Benjamin and Perrin; Costar) and training in coping skills (Wilson and Rotter; Little and Jackson; Danielson; Mann; Barbasz) have also been shown to be beneficial for test anxious students.

Interfering test anxiety can be recognized and its effects minimized through intervention.

RECOMMENDATIONS

It is recommended:

1. that further study be conducted on the effectiveness of optimizing the performance of highly test anxious students through the adjustment of evaluative procedures.
2. that further study be conducted examining the effectiveness of the various coping skills.
3. that schools of teacher education include instruction on the recognition and intervention of interfering test anxiety.

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I feel I am qualified to study this particular
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its implications and methods of dealing with
it.